Sept. 12, 1933. J. KRIEGLMEYER 1,926,290

COUNTER PRESSURE FILLING APPARATUS

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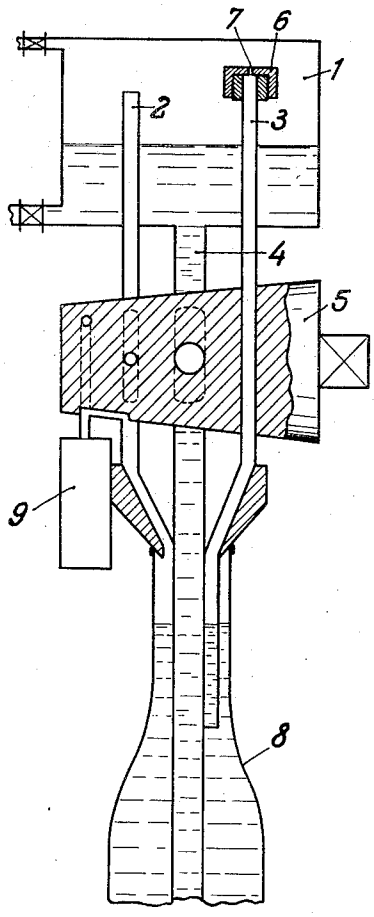


Fig. 1

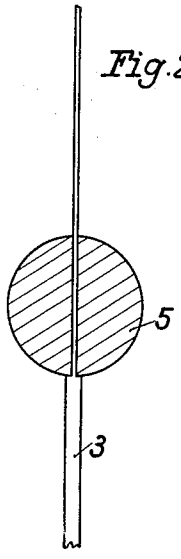


Fig. 2

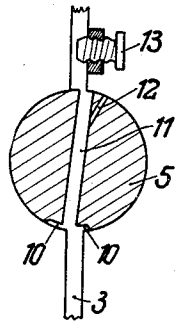


Fig. 3

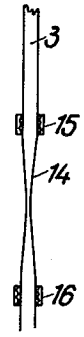


Fig. 4

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COUNTER PRESSURE FILLING APPARATUS

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Application January 4, 1933, Serial No. 650,067, and in Germany June 9, 1932

11 Claims. (Cl. 226—115)

In the known counter-pressure, pressure equalizing filling apparatus having filling members in the form of valves, cocks, sleeves or plungers and two pressure equalizing conduits, the return liquid, that is the small quantity of liquid left after each filling in the return pressure equalizing conduit is driven upwards into the main liquid vessel when the next bottle or other container is filled, by the air displaced from the bottle. To make this possible the return pressure equalizing conduit must not have too small a cross section, say not less than 12 sq. mms.

In order to prevent escape of gas from the liquid vessel through the open return pressure conduit in the event of breakage of the bottle during filling, this conduit has been provided with a check valve which cuts off downward flow through this conduit. But these valves often fail in practice; the gas or air escapes if a bottle breaks, and owing to the resulting drop in pressure in the liquid vessel undesirable and harmful foaming of the liquid takes place.

In order to avoid infection of the beer or the like in the liquid vessel by the small quantity of liquid referred to above in the return pressure pipe, it has been proposed to discharge this pipe not upwardly into the vessel, but downwardly, either positively or not, for example into the bottle, into the open air or into a vessel which can be under the same pressure as the main liquid vessel. If now with such downward discharge the return conduit is of the same dimensions as with upward discharge, the light foam unavoidably formed during filling will be forced up through this conduit and through the heavy beer or the like into the main liquid vessel and may infect the contents thereof.

With positive downward discharge of the return conduit it is a further disadvantage if the air or gas pressure drives the small quantity for example of beer in the conduit downwards too rapidly as if it is discharged into a bottle foaming results and if into the open air considerable air or gas loss results which leads to reduction of pressure and foaming in the main liquid vessel.

The present invention relates solely to counter pressure, pressure equalizing filling apparatus having two pressure equalizing conduits and employing downward discharge of the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position. The objects of the invention are to avoid the passage of foam out of the return conduit into the main liquid vessel, to retard the downward discharge of the liquid in said conduit and to hinder the drop in pressure in the main vessel in the event of breakage of a bottle during filling. To this end a reduction in cross section is provided at one point in the return pressure equalizing conduit, or over a part of its length or over its whole length; such reduction in practice may be to below 12 sq. mms. and advantageously even to below 8 sq. mms. With such apparatus bottles can be filled for example with the most sensitive and not very cold beers at the highest rate of the apparatus and headless filling always obtained. The filling of bottles with strongly foaming liquids such as beer is affected by very small factors which are nevertheless very decisive in their effect on the final result. The most satisfactory result, namely headless filling, is only obtained by suitable combination of various elements.

A counter-pressure, pressure equalizing filling apparatus having two pressure equalizing conduits, the return conduit of each filling being filled with liquid up to the level in the main liquid vessel, and in which the said return conduit is always emptied downwardly but never into the empty bottle to be filled, when the said conduit is throttled in accordance with the invention, satisfactorily fulfills all the conditions which can be imposed on a filling apparatus both biologically and as regards headless filling.

The invention is diagrammatically illustrated in the accompanying drawing.

Figure 1 is a vertical section of the filling apparatus with a bottle in position,

Figures 2, 3 and 4 shows three alternative modes of providing the reduced cross section of the return conduit.

The throttling of the return pressure equalizing conduit is advantageously effected at a point above the liquid level in the main vessel; the reduction in cross section acts in both directions so that if a bottle breaks, drop in pressure in the vessel is hindered.

The reduction in section can be permanent or in an exchangeable part; or it can be regulatably constructed and it may exist during the whole of the filling cycle or only during part thereof.

For example an arrangement in which the reduction in cross section is formed at the upper end of the return conduit by means of a preferably exchangeable blind nut, cap or the like with a small aperture, has been found very suitable in practice.

Tests show that the reduction in section of the

return conduit is of value only in counter-pressure, pressure equalizing apparatus if two pressure equalizing conduits are provided and if the return conduit is empty before the next bottle to be filled is placed in position.

Figure 1 shows the apparatus in the position in which the pressure equalizing conduit and the liquid conduit are closed, while the return pressure equalizing conduit is open. The main liquid vessel is designated 1, the pressure equalizing conduit 2, the liquid conduit 4, the return pressure equalizing conduit 3 and the filling cock 5. On the upper end of the return conduit 3, in the main vessel 1 under pressure, is screwed a blind nut 6, having an aperture 7 which is small compared with the cross section of the conduit 3. The filled bottle 8 is connected during the downward emptying of the conduit 3 with an auxiliary vessel 9 as described in my co-pending application Serial No. 603,057.

Figure 2 shows a filling cock 5 in cross section through the return conduit, provided with a return conduit 3 of reduced cross section over part of its length, the reduced section being provided for example in the cock plug and the part of the conduit above it.

In Figure 3, which shows a filling cock 5 in cross section through the return conduit, the reduction in cross section is produced in a certain position of the cock plug by the passages 10, 11 therein and/or the passage 12, which comes into action when the direct through passage 11 is not in line with the conduit 3. In addition the conduit 3 is also provided with a regulatable reduction in section formed by the throttle valve 13.

Figure 4 shows a part 14 with reduced cross section interposed at a suitable point in the conduit 3 and exchangeable by the aid of unions 15, 16.

The operation of the apparatus will be apparent from the drawing.

It only remains to be stated that the throttling of the return conduit enables a liquid conduit 4 of large cross section to be employed.

What I claim is:

1. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of means for reducing the cross section of said return conduit to an amount serving to prevent the passage of foam from said conduit into the main liquid vessel, and to hinder the drop in pressure in the main vessel in the event of breakage of a bottle during filling.

2. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of means reducing the cross section of said return conduit to below 12 sq. mms.

3. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of means reducing the cross section of said return conduit to below 8 sq. mms.

4. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of means throttling said return conduit located in the main liquid vessel.

5. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, a member having a small bore aperture relative to the cross section of said return conduit mounted upon the upper end of said conduit.

6. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of exchangeable means throttling said return conduit.

7. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle or the like to be filled is placed in position, the provision of variable means throttling said return conduit.

8. Counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle is placed in position, said return conduit comprising a portion of its length of less area of cross section than 12 sq. mms.

9. Counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits and means for downwardly discharging the return pressure equalizing conduit before the next bottle is placed in position, said return conduit comprising a portion of its length of less area of cross section than 8 sq. mms.

10. In counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits, means for downwardly discharging the return pressure equalizing conduit before the next bottle is placed in position and a filling cock, the provision in said cock of means for throttling said return conduit.

11. Counter pressure apparatus for filling bottles and the like having two pressure equalizing conduits, means for downwardly discharging the return pressure equalizing conduit before the next bottle is placed in position, and a filling cock, said cock having a full bore channel therein which completes said return conduit in one position of said cock and a small bore channel which completes the said return conduit in another position of said cock.

JOSEF KRIEGLMEYER.